

# SERBEP Update

NOVEMBER 1995

A Publication for  
the General  
Biomass  
Community

The Southeastern Regional  
Biomass Energy Program is  
one of five regional biomass  
energy programs. It is  
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Department of Energy  
Office of National Programs  
by the Tennessee Valley  
Authority's Environmental  
Research Center in Muscle  
Shoals, Alabama. The  
13-state region includes  
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Louisiana, Arkansas, and  
Alabama.

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## VENTURE FINANCING: ISSUES FOR RENEWABLE ENERGY AND RENEWABLE USES

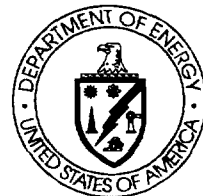
What do biomass energy entrepreneurs and potential investors say about financing a new business in today's environment? First, there is a lack of traditional venture capital investing in alternative energy and renewable uses startup businesses, especially in the Midwest and the Southeast; second, entrepreneurs in this industry need to continue efforts to structure businesses in a way that will attract outside capital; and third, creative financing and strategic partnerships are very effective and will continue to be successful in any environment.

Obtaining financing for a new business is never easy. This article will examine some of the issues with venture capital financing in particular. We will also look at what criteria investors will use to evaluate a new business. We will look at how these criteria translate into risk and rate of return for an investor. Finally, we will look at some creative financing alternatives, especially strategic partnerships. Keep in mind—there is money available for the right opportunities.

**Venture Capital Background.** It is important to define what venture capital is and what it isn't. When we talk about venture financing, we are talking about the true risk capital. This is the equity at the bottom of the pile when things go wrong. It is also, therefore, the portion of the investment that shares in the upside when the business takes off. There may be layers of other capital—bank debt, government loans, and even different layers of equity, that finance a venture. We'll focus on the initial equity needed to launch a business.

The lack of assets in the early stages of business development make debt hard to get and equity more risky. If the first prototype doesn't work, then the equipment left is probably not worth much. This has a couple of financing implications. First, most debt requires security, so debt is tough to get and risky for both parties in a new startup. Secondly, because of the lack of security to fall back on, the risk is highest, and the early equity investors will demand a high rate of return.

The rate of return required will be discussed later; however, it is important to understand that achieving this return usually requires an "exit strategy." Cash flow and dividends usually aren't enough



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### Alexander Hollaender Postdoctoral Fellowship

**Program**—This program is supported by the U.S. Dept. of Energy, Office of Health and Environmental Research (OHER), and administered by the Oak Ridge Institute for Science and Education. The OHER mission is directed at understanding the health and environmental effects associated with energy technologies, and developing and sustaining basic and applied research programs at the frontiers of biomedical and environmental sciences in which DOE has responsibilities or unique capabilities. Disciplines appropriate to the fellowship program include those in the life, biomedical, and environmental sciences and other supporting scientific disciplines. Completed applications and all supporting materials must be received by *January 15, 1996*. Fellowship offers will be made in May 1996. For more information and application material, contact Hollaender Postdoctoral Fellowships, Science/Engineering Education Division, Oak Ridge Institute for Science and Education, P.O. Box 117, Oak Ridge, TN 37831-0117, (615) 576-9975.

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to provide the high returns required; the company will need to plan on a public offering or a buyout in the future to return adequate cash to investors.

Finally, early stage equity investors will usually fund money in stages as the company meets agreed-upon milestones. Generally, expect two to four financing rounds for a startup business. This staged investment reduces the risks for the investors and should preserve ownership for owners as the company grows with each round.

Let's look at the venture industry in total. During 1994, about 4% of total venture investments went to seed stage companies. Another 15% went to startup companies. The rest, over 80%, went to established companies looking for expansion or for buyouts of existing companies. It is very tough anywhere for new ideas and new companies to get that first critical equity investment. The risk is too high for most venture capital firms, and they'd rather invest in established, but fast growing, companies. (All industry information is per the National Venture Capital Association 1994 survey.)

Another hurdle for a new alternative energy or renewable uses company is the lack of investment in energy and environmental deals. In 1994, less than 1% of venture investments were in the energy field, and less than 1% in the environmental area. Alternative energy and new agricultural uses are subsets of these subsets. This has several big negative implications for our industry. First, it's hard to find someone who knows the industry, and it's hard to get someone to take the time to learn. If I'm a venture investor and I know medical, or computers, or retailing, and I'm seeing plenty of good deals in that area, then my incentive to work really hard and learn a new area is low. Additionally, if you do find someone willing to listen and learn, you run the risk of taking a long time educating people who don't ultimately invest.

The lack of an existing network of venture capital firms investing in alternative energy and renewable uses makes it harder for other firms to jump in. Venture firms often like other venture investors in on their

deals, so they can reduce risks, network for management teams better and have cash for next round investing. Firms will often co-invest on each other's deals seeding the due diligence time and number of deals each can do. For an early investor in a new industry, they lose these networking benefits, making it harder for any one firm to take a risk on a single investment.

Another factor in venture investing is its regional nature. It's just easier to do deals close to home—easier to network, recruit management, other investors, etc. In 1994, only 7% of venture capital investments were in the Southeast, and only 11% in the Midwest. Biomass energy startups, with the tremendous natural resources concentrated in these two regions, are at a special disadvantage because of the relatively low level of venture activity in the Southeast and the Midwest.

Wait, where is the good news? Well, about \$2.75 billion was invested in non-public deals last year. Over eleven hundred companies received venture financing. There is money out there for good, solid deals. What kind of criteria are these investors looking for?

**Investor Criteria.** Venture investors generally perform extensive due diligence prior to making any investment. Following are several key factors investors will evaluate, in rough order of priority.

- **Management**—The absolute key criteria to any investor. Does the team have direct experience in this area? Successful startup experience? Does the team have depth, beyond just the founder?
- **Technology**—Is it patentable? Is it protectable (patent may not give real protection)? What is the time horizon to prove the technology? Cost to prove? Hurdles? Prototype done?
- **Proven Market**—Does this product target an existing market? What is the customer involvement in your R&D? What are the clear advantages over other approaches?
- **Use of Proceeds**—How do you plan to use the money? Working capital?

Buyout of partners? Outside prototype? Need to be clear and look beyond this round of financing.

- Regulatory Impact—How will changes affect your plan? Any regulatory hurdles?
- Rate of Return—Sensitivity to changes? Upside potential?

The better a company can answer these issues, the easier it is for an investor to understand your business. By helping an investor with their due diligence, the easier you make their job and the more likely it is for someone to invest.

**Risk Profiles.** The level of risks associated with the criteria above vary greatly depending on the type of investment and type of company. If this is a new company with new technology or a new company using existing technology, the risks and profiles look different. Table 1 highlights how investors would evaluate a project differently than a new technology startup. Especially with alternative energy and renewable uses, investments may have combinations of each of these.

These differences in risks translate into different expected returns for investors and cost of capital for owners. Figure 1 highlights how required equity returns to investors can vary with risk.

**Financing Sources.** OK, so you've identified your idea as high risk, high return, and you've assembled your team and

done all your homework. Where do you get money?

For early stage companies, almost half the money raised comes from friends and family, and other individuals. These can be great sources, but maybe can't fund your next round. These individuals may provide more advice than you need, or not enough when you need help.

Governments of various levels can also be excellent funding sources. Are you a consulting and research company or a commercial enterprise? Can you rely on the grant year to year?

As discussed above, venture financing is difficult in today's environment. The analysis above highlighted their key criteria, and from there it is diligence and hard work to find the right investor. Building on that approach, there is another direction that overcomes some obstacles now faced by renewable companies raising venture capital, and that is to approach strategic investors.

The idea of strategic investors is not new, but it is especially appropriate for our new industry. A strategic investor is generally an existing company with an interest in your company and its developments. The strategic investor will look to gain something from the relationship beyond a strict return on investment. Why look to this group, and what are the risks?

The positive aspects of a strategic investor are strong, and with proper structur-

#### **Biomass Equipment Selection Guide**

**Update**—SERBEP will update its biomass solid-fueled direct combustion or gasification selection guide in the near future. The first edition focused on off-the-shelf equipment. The second edition will be broader in scope to include custom-made equipment. If your company was not included in the last edition, let us know as soon as possible if you want to be included in the next edition.

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Table 1. Venture Financing: Risk Assessment  
Project Financing Versus Company Startup

	Project Financing	Company Startup
Management	Direct experience	?
Technology	Proven	New
Market	Long term contracts	New
O&M Track Record	Yes	No
Rate of Return Variability	Low	High
Rate of Return Required	Lower	High

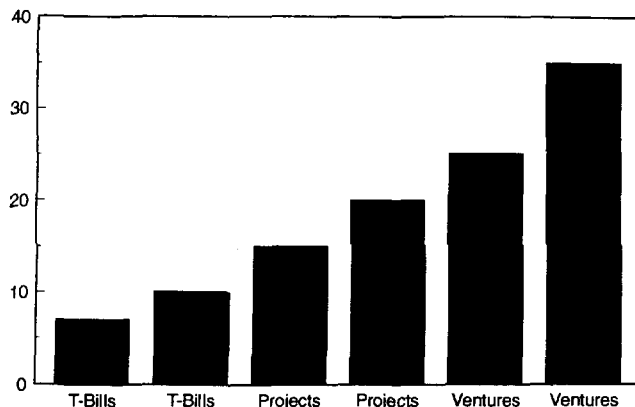


Figure 1. Venture Financing Required Equity Returns

### Biomass Electrical Generation

**Equipment**—SERBEP will publish a review of technologies currently commercially available for generating electricity from biomass fuels. This will not include large-scale utility boilers but is geared toward cogeneration or distributed power generation. Contact SERBEP immediately if you want SERBEP to survey your company for this review publication.

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ing usually can outweigh the negatives. Positives include a lower return requirement (they get something besides a financial return); they generally understand the risks of your business (they'll make a decision faster and be more tolerant of missed milestones); they will have access to capital, often greater than venture funds; they can provide development or marketing help your small business may really need; they can give you a built-in "exit strategy" option if you decide to sell to them.

These positives come with a cost. There will be strings attached (manufacturing rights, marketing exclusivity, etc.); their long-term vision may be different (they may only care about selling more of their own widget); they may offer experience but it's not directly related enough to be helpful; having them as an investor may turn off other customers; and, having a built-in "exit strategy" may limit your upside. (You'll get bought out before hitting a real homerun. This factor also potentially limits interest from strictly financial investors)

Identifying a strategic investor is obviously an important activity. We recommend spending effort here because of the side benefits, even without an investment. By examining whom you could link with you'll clarify your own strategy. You'll also clarify why you are different, identify your own strengths and weaknesses, and maybe identify a different target customer.

Identifying these linkages means fitting your company's vision to that strategic investors needs. Can you help them sell more of their product? Do you help them with their customers? Again, analyzing your company from an outsider viewpoint will strengthen your own efforts.

Keep in mind - **money is available**. This industry needs some good technology pushed into the marketplace, and some commercial successes on which to build. Those success stories will help create a critical mass to attract additional capital, making the next wave of startups easier.

*(This article was prepared by David Forsee, General Partner of Brookside Capital. Brookside Capital provides investment and strategic advisory services to early stage companies in the renewable energy and renewable uses area. You can reach them at 1002 West 63rd St., Kansas City, MO 64113, (816) 333-9011, fax (816) 333-9012.)*

### MOBILE PELLETIZER DEVELOPED

Herbaceous materials such as switchgrass hold great potential as future energy crops. However, unbaled, loose switchgrass is expensive to transport and difficult to handle and burn. On the other hand, baled switchgrass can require special handling equipment and can have significant losses from storage and handling. A new machine developed in Europe may provide the best

of both options. The new machine is a mobile pelletizer for straws and grasses. In-field pelletizing provides a dense material that can be handled, transported, and stored in a cost-effective manner similar to grain. Additionally, pellet fuels readily burn in most combustion systems. The mobile pelletizer can also be used to produce pellets for feed from a variety of different grasses. Tests to produce alfalfa pellets are planned.

In Middle Europe, which apparently has large areas suitable for production of herbaceous energy crops, a machine named the "Biotruck 2000" has been developed to mechanize the production of energy crops such as cereals and grasses. The machine is described by Dr. Peter Sutor of the Bavarian Ministry of Food, Agriculture, and Forestry, in the proceedings of the Second Biomass Conference of the Americas held in Portland, Oregon, last August.

In a photograph included in the proceedings, the machine resembles an ordinary harvesting machine like a grain combine more than a truck. A header on the front cuts and collects the plants and feeds a "chaffing" device that chops the plants to about 0.6 mm (less than 1/64-inch) long particles. These particles are then pneumatically conveyed to a dryer behind the cab. The dryer uses air heated by the engine exhaust and oil cooling radiators to heat the chaff to about 212°F and remove about 7 percent of the water. After drying, augers force the material between two press wheels which form the pellets. Waste heat from the engine is used to heat the press wheels to 175°F to 250°F. The heat softens and activates the natural adhesives in the plant material and allows it to be formed into pellets that will harden and not crumble easily. No additional binding agent is needed to form the pellets. Following pellet formation, the pellets are conveyed to a hopper at the rear of the machine.

The final product is a clam-sized pellet about 2.5 by 1.5 by 0.5 inches with a density of 75 lb/ft<sup>3</sup> (about that of coke or lignite) and a bulk density of 40 lb/ft<sup>3</sup> (about that of cereal grains and about twice that of

baled straw). To get well formed pellets which can be stored without problems, a moisture content of less than 22 percent is necessary for the harvesting material.

Dr. Sutor claims a production rate of 8 tons per hour. To date, a production rate of more than 7.5 tons per hour (wheat and straw) has been reached in tests. At this rate, in an eight-hour day it produces pellets containing 700 to 800 million Btus, equivalent to 32 tons of coal or 2 megawatts of electricity. An enormous advantage from the point of the view of European farmers is the possibility to use the mobile pelletizer to produce feed. This allows use of the machine for about five months per year and helps to reduce the fixed costs.

The pelletizer has been developed in cooperation with CLAAS, a world-wide known manufacturer of harvesting equipment.

Progress naturally comes with a price tag. In this case a unit costs about DM 1 million or about \$700,000 U.S. dollars although the planned selling price is expected to be DM 600,000 to DM 700,000. Considering the advantages—if all goes as described—it doesn't seem like too much. The Biotruck 2000 may be a step toward the necessary reduction in labor, transportation, and handling costs that have been a roadblock in the development of a uniform, transportable fuel from herbaceous crops.

For additional information contact Dr. Peter Sutor at Bay, Staatsministerium für Ernährung, Landwirtschaft und Forsten, Munich, Germany 80, phone +011 49 89 21 82 704 or fax +011 49 89 21 82 712.

#### **NEW COMMUNUTER/DEHYDRATOR DEVELOPED**

A newly invented milling technology could have far-reaching implications for several industries including several biomass energy industries. Some advantages of the system are its simplicity, versatility, and ability to selectively break down materials into specific components. The latter feature may allow preliminary processing for several biomass energy processes to recover valuable coproducts such as starch, protein, gums, bran, and germ oil. For exam-

**Proceedings** from the Second Biomass Conference of the Americas held in Portland, Oregon, August 1995, are available from Milly Lemmons, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden, CO 80401, phone (303) 275-3098, fax (303) 275-3097. Proceedings are \$50 each. Payment may be made in any form except credit card and must be in U.S. funds. Payment must be received in advance.

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**NBIA/UBECA First Joint Annual Meeting—Strategic Alliances for Biomass Energy**, the first joint annual meeting of the National BioEnergy Industries Association (NBIA) and the Utility Biomass Energy Commercialization Association (UBECA), will be held November 14-16, 1995, in Washington, DC. The overall conference will focus on the implementation of bioenergy projects, featuring case studies within the U.S. and around the world, federal policy facts and opportunities, tax and financial concerns, cooperative ownership and agriculture issues, the changing power production industry, and the programs impacting biomass at the Departments of Energy and Agriculture, the Environmental Protection Agency, the U.S. Agency for International Development, and some key sub-programs. For more information, contact Angela Barbara at UBECA, phone (202) 296-8663, fax (202) 223-5537, or Brandy Smith at NBIA, phone (202) 383-2540, fax (202) 383-2670.

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ple, the inventor says his mill can be used to extract the germ from a corn kernel and selectively pulverize the rest of the kernel—all in one operation. Since the new mill processes at a fraction of the cost of a conventional mill, such ability to recover coproducts could greatly improve the economics of many biomass processes.

The inventor, Frank Rowley, Jr., of Valley Center, Kansas, says the key to the new mill is its construction. The mill has only one or two moving parts—a fan, and in some applications, an airlock.

In operation, the mill subjects materials to positive and negative air pressure zones and resonant frequencies similar to those found in the eye of a tornado. Grain and other materials have a resonance at which they will fractionate—just as a high soprano singer shatters a glass. Subjecting materials to selective resonance frequencies causes the materials to literally explode along their natural fracture lines. The particles can then be separated by their density or particle size differences.

Since there is no mechanical impact involved in the milling process, particles are not subjected to heat or abrasion which can cause chemical changes or odor. As an added bonus, the vacuum zones in the mill can act to dehydrate materials even though the process occurs at ambient temperatures. This allows the system to be used for such applications as alfalfa dehydration where high temperatures can destroy nutrients and reduce its value. Rowley has been able to take field chop alfalfa, process it through his machine to separate stems and leaves—while pulverizing the leaves—to produce a high protein product.

Researchers at Minnesota's Agricultural Utilization Research Institute (AURI) are amazed at the "Air Ground" machine's capabilities. The researchers were able to easily separate corn, wheat, buckwheat, and barley grains into their natural components. They are extremely interested in applying the technology to small-scale ethanol plants.

According to Rowley, the mill can also handle a wide range of input particle sizes

and materials from rocks to styrofoam with little or no system modification. In one test, granulated sugar was reduced to a powder without any system adjustment. In another test, Rowley was able to reduce a bottle to powder while leaving its label intact. In addition to grain, materials processed to date include newspaper, wood chips, and glass. He says it is excellent for dehauling and debranning grains such as rice. It is claimed that no other grinder can handle such a wide range of materials so cost effectively and with similar results.

For additional information contact Frank Rowley, Jr., Gradient Force, Inc., 11134 North Meridian, Valley Center, Kansas 67147, phone (316) 755-1414 or Gordon Sensteliie at Minnesota's Agricultural Utilization Research Institute (AURI), P.O. Box 599, Crookston, Minnesota 56716 at (218) 281-7600 or fax (218) 281-3759.

#### **POWERLINE POLE RECYCLING**

As reported at the recent Biomass Conference of the Americas in Portland, Oregon, a new process developed in Canada by TWT Wood Products, Inc., may have major implications for recycling utility poles. The process works with any oil-based wood preservative including creosote and pentachlorophenol (PCP). The process is capable of recovering the treatment chemicals out of wood shavings and, in the process, providing wood that can be used for virtually any application including reuse as utility poles. Since poles cost approximately \$150 each, the cost savings to utilities can be significant. Society benefits from the reduced need to cut trees and from disposing of treated wood in an environmentally friendly manner.

Approximately 3 million poles are removed from service each year in North America. Treated poles are designed to have a life of 40 years but one study found the average life of poles taken out of service was only 12 years. Poles are removed from service because of new road construction or other reasons requiring powerline relocation or because their size is too small to carry new lines.

*Continued on Page 8*

## Calendar of Events

### November 7-9, 1995

Chicago, Illinois  
*1995 Consortium for Plant  
 Biotechnology Research Symposium*  
 Dorin Schumacher  
 1220 Potter Drive, Ste 130-D, West  
 Lafayette, IN 47906-1383  
 tel (317) 463-4000  
 fax (317) 497-3168

### November 13-15, 1995

Allentown, Pennsylvania  
*Fluid Bed XI*  
 Registrar, Council of Industrial Boiler  
 Owners, 6035 Burke Centre Parkway,  
 Suite 360, Burke, VA 22015  
 tel (703) 250-9042  
 fax (703) 239-9042

### November 14-15, 1995

Arlington, Virginia  
*8th International Incinerator Ash  
 Management Conference*  
 Coordinate Group, Box 3356,  
 Warrenton, VA 22186-1956  
 tel (540) 347-4500  
 (800) 627-8913  
 fax (540) 349-4540

### November 14-16, 1995

Washington, D.C.  
*First Joint Annual Meeting of the  
 National BioEnergy Industries  
 Association and the Utility Biomass  
 Energy Commercialization Association*  
 Angela Barbara, UBECA, (202)  
 296-8663, fax (202) 223-5537 or  
 Brandy Smith, NBIA, (202) 383-2540,  
 fax (202) 383-2670.

### November 15, 1995

Birmingham, Alabama  
*Southeastern Energy Society  
 November Meeting* (potential visit to a  
 new turbine project)  
 SEES, % GSPE, Suite 226, 1900  
 Emery St., NW, Atlanta, GA 30318  
 tel (404) 355-0177  
 fax (404) 355-0178

### December 4-5, 1995

Arlington, Virginia  
*Sustainable Development and Global  
 Climate Change*  
 Center for Environmental Information,  
 50 West Main Street, Rochester, NY  
 14614-1218  
 tel (716) 262-2870  
 fax (716) 262-4156

### December 6-8, 1995

San Diego, California  
*SAE International Alternative Fuels  
 Conference & Exposition*  
 Sandi Kline, Alternative Fuels Conf.,  
 SAE, 400 Commonwealth Dr.,  
 Warrendale, PA 15096-0001

### December 11, 1995

Miami Beach, Florida  
*The 3rd Annual Southeast Power  
 Market Conference, Restructuring the  
 Southeast Power Market*  
 Southeast Power Report, 1221 Avenue  
 of the Americas, New York, NY 10020  
 fax (212) 512-2723

## 1996

### March 22-25, 1996

Charlotte, North Carolina  
*Hearth & Home Expo '96*  
 Hearth Products Association, 1555  
 Wilson Blvd., Suite 300, Arlington, VA  
 22209  
 tel (703) 875-8711  
 fax (703) 812-8875

### April 13-18, 1996

Asheville, North Carolina  
*Solar 96, National Solar Energy  
 Conference*  
 American Solar Energy Society, 2400  
 Central Avenue, Suite G-1, Boulder,  
 CO 80301  
 tel (303) 443-3130  
 fax (303) 443-3212

### April 14-17, 1996

Sun City, South Africa  
*11th International Symposium on  
 Alcohol Fuels*  
 Professor R. K. Dutkiewicz, Energy  
 Research Institute, University of Cape  
 Town, P.O. Box 207, Cape Town,  
 7800, South Africa  
 fax (27) (021) 705-6266

### May 5-9, 1996

Gatlinburg, Tennessee  
*Eighteenth Symposium on  
 Biotechnology for Fuels  
 and Chemicals*  
 Brian H. Davison, Oak Ridge National  
 Laboratory, PO Box 2008, Bldg. 4505,  
 Oak Ridge, TN 37831-6226  
 tel (423) 576-8522  
 fax (423) 574-6442

### May 20-24, 1996

Banff, Canada  
*Developments in Thermochemical  
 Biomass Conversion*  
 Dr. Tony Bridgwater, Energy  
 Research Group, Aston University,  
 Birmingham B47ET, United Kingdom  
 tel: +44 121 359 3611 ext. 4647  
 fax: +44 121 359 4094

### June 24-27, 1996

Copenhagen, Denmark  
*9th European Bioenergy Conference*  
 DIS Congress Service Copenhagen  
 A/S, Herlev Ringvej 2C, DK-2730,  
 Herlev, Denmark  
 fax +45 - 4492 5050

### July 14-18, 1996

San Diego, California  
*Fifth World Congress of Chemical  
 Engineering*  
 AIChExpress Service Center  
 345 East 47th St.  
 New York, NY 10017-2395  
 tel (212) 705-7373  
 fax (212) 705-8400

### September 15-17, 1996

Nashville, Tennessee  
*ASAE Liquid Fuel and Industrial  
 Products From Renewable Products*  
 Susan Buntjer, ASAE, 2950 Niles Rd.,  
 St. Joseph, MI 49085-9659  
 tel (616) 428-6327  
 fax (616) 429-3852  
 e-mail buntjer@asae.org

### September 15-19, 1996

Nashville, Tennessee  
*Bioenergy '96--The Seventh National  
 Bioenergy Conference*  
 Phillip Badger, TVA Southeastern  
 Regional Biomass Energy Program,  
 Muscle Shoals, AL 35662-1010  
 tel (205) 386-2925  
 fax (205) 386-2963



*SERBEP Update*  
Southeastern Regional Biomass Energy Program  
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SERBEP  
UPDATE

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The use of trade names is for information purposes only and does not imply endorsement, nor does the omission imply lack of endorsement, by the federal government.

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**Just a reminder**—Each month we receive returned newsletters with no forwarding address available. We are forced to remove these names from our mailing list. If you have moved and wish to keep receiving the *SERBEP Update*, please be sure to send us your new address.

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To recycle, poles are brought to a recycling center where they are scanned for nails, staples, and other metals that may damage the peelers or saws. The poles are also inspected for recycling suitability. A project with TransAlta Utilities Corporation, Canada's largest investor-owned utility, found that 65 percent of the poles could be cost effectively recycled through the chemical recovery process (35 percent as poles, 30 percent for non-utility applications requiring treated wood). The remaining 35 percent of the poles were best utilized by not recovering the chemicals, but sawing them into dimensional lumber for markets with exterior uses.

Recycling is accomplished by peeling the poles until sound fiber is reached—not necessarily until all the treated portion is removed. The amount of wood removed depends on the type of wood since chemical penetration is wood species dependent. Typically, from 3/8 to 1 inch is removed.

Shavings removed are conveyed to a thermolysis plant where they are heated to distill off the vapors which are then con-

densed for recovery. The shaved pole is then retreated and reused. Shaved poles too small for reuse as poles are used in construction applications such as pole barns, sheds, fence posts, and landscaping. Another company has patented a process to mix the cleaned shavings with flyash for use as a concrete additive. Use in cement reduces the cost of the cement while solving the flyash disposal problem for the utility.

TWT has constructed a facility east of Calgary that can recycle 30,000 poles per year. This facility has provided recycled poles for the construction of two power lines now in use by TransAlta Utilities Corporation. The recycling process can go on indefinitely; however, reuse as poles is limited by the size of the pole. Each recycling operation reduces the size of the pole, requiring that it be used in lighter service applications.

For additional information contact Dr. Peter Fransham, TWT Wood Products, Inc., 537 Hamptons Mews, NW, Calgary, Alberta T3A 5B1, phone (403) 861-3424 or fax (403) 282-7026.

